

REMARKS

Claims 14-49 are pending in this application. By this Preliminary Amendment, Applicant AMENDS the specification and the abstract of the disclosure, CANCELS claims 1-13 and ADDS new claims 14-49.

Applicant has attached hereto a Substitute Specification in order to make corrections of minor informalities contained in the originally filed specification. Applicant's undersigned representative hereby declares and states that the Substitute Specification filed concurrently herewith does not add any new matter whatsoever to the above-identified patent application. Accordingly, entry and consideration of the Substitute Specification are respectfully requested.

The changes to the specification have been made to correct minor informalities to facilitate examination of the present application.

Applicant respectfully submits that this application is in condition for allowance. Favorable consideration and prompt allowance are respectfully solicited.

Respectfully submitted,

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DESCRIPTION

TELEPHONE INTERPRETATION SYSTEM

5

BACKGROUND OF THE INVENTION

1. Field of the Invention

TECHNICAL FIELD

The present invention relates to a telephone interpretation system for providing interpretation services when persons who speak different languages hold a telephone conversation. In particular, the present invention relates to a telephone interpretation system capable of providing foreigners who speak different languages with public services such as those from administrative institutions, the police, and hospitals without resident interpreters.

2. Description of the Related Art

20 BACKGROUND ART

Conventionally, when persons who speak different languages hold a telephone conversation, interpretation services are provided by using a three-party telephone call service. More specifically, the caller calls a company that

provides interpretation services, and provides the  
receptionist with tells the reception person about the language  
and the telephone number of the callee. Then, an interpreter  
for interpreting the language of the caller and the language  
5 of the callee is selected, and the selected interpreter calls  
the callee while maintaining the connection with the caller.  
Consequently, the telephone of the caller and the telephone of  
the callee are connected via the telephone of the interpreter  
in a three-party call arrangementfashion, which allows  
10 conversation among the three. The interpreter listens to and  
interprets the speech of the caller into the language of the  
callee, and listens to and interprets the speech of the callee  
into the language of the caller, whereby the caller and the  
callee can have a hold telephone conversationconversion through  
15 the interpreter.

In the conventional telephone interpretation system using  
such a three-party call, however, the caller or callee who is  
speaking might be interrupted since he/she hears the voice of  
the interpreter when the interpreter conducts simultaneous  
20 interpretation of the speech of the speaker. The other party  
might have difficulty in understanding the words since he/she  
hears the voice of the speaker and the voice of the  
interpreter which overlap each other. For this reason, in the  
conventional interpretation services using a three-party call,  
25 the interpreter waits forawaits the completion of the speech

of the caller before interpretation. The callee waits  
forawaits the completion of the interpretation before speech.  
The interpreter then waits forawaits the completion of the  
speech of the callee before interpretation. Since such a  
5 procedure must be repeated, there has been the problem that it  
is difficult to provide quick and precise interpretation  
services.

The same is true~~holds~~ for situations where interpretation services are provided by using a telephone conference service.

10 To be more specific, when the telephone conference service is used, the telephone of the caller, the telephone of the callee, and the telephone of the interpreter establish respective connections to a multipoint connection unit. Here, the multipoint connection unit synthesizes the voice of the caller,  
15 the voice of the callee, and the voice of the interpreter, and transmits the result~~resultant~~ to each of the telephones. Thus, the caller or callee who is speaking might be interrupted since he/she hears the voice of the interpreter when the interpreter conducts simultaneous interpretation of the speech  
20 of the speaker. The other party might have difficulty in understanding the words since he/she hears the voice of the speaker and the voice of the interpreter which overlap each other.

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To overcome the problems described above, preferred embodiments of the present — It is thus a chief object of the invention to provide a telephone interpretation system and a telephone interpretation method that is capable of quick and 5 precise interpretation in which an interpreter or interpreters can conduct simultaneous interpretation even while the caller or callee is speaking, without interrupting the speech of the speaker or hindering the other party from understanding the interpretation.

10 According

~~DISCLOSURE OF THE INVENTION~~

A telephone interpretation system according to a first preferred embodiment of the present invention, a telephone interpretation system claim 1 is provided for interpreting 15 a call between a caller and a callee who speak different languages through an interpreter. The telephone interpretation system includes connecting means for connecting a caller terminal, a callee terminal, and an interpreter terminal, and communication means for conducting voice 20 communications among the terminals connected by the connecting means. The communication means includes has a first voice transmission function of synthesizing a voice from the callee terminal and a voice from the interpreter terminal and transmitting the resultant to the caller terminal, a second 25 voice transmission function of synthesizing a voice from the

caller terminal and the voice from the interpreter terminal and transmitting the resultant to the callee terminal, and a third voice transmission function of synthesizing the voice from the caller terminal and the voice from the callee

5      terminal and transmitting the resultant to the interpreter terminal. The telephone interpretation system further includes~~has~~ an unnecessary side voice suppressing function of suppressing an unnecessary voice, either the voice from the interpreter terminal to be supplied to the first voice

10     transmission function or the voice from the interpreter terminal to be supplied to the second voice transmission function, by a command from the interpreter terminal. The first voice transmission function includes~~has~~ a callee voice suppressing function of suppressing the voice from the callee

15     terminal when the voice from the interpreter terminal is detected. The second voice transmission function has a caller voice suppressing function of suppressing the voice from the caller terminal when the voice from the interpreter terminal is detected.

20       According to this preferred embodiment of the present invention, the unnecessary side voice suppressing function suppresses the transmission of the voice of the interpreter to an unnecessary side, either the caller or the callee, by a the- command from the interpreter terminal. In addition, the

25     transmission of the voice of the callee to the caller in the

original language is suppressed when the voice of the interpreter is detected by the callee voice suppressing function. The transmission of the voice of the caller to the callee in the original language is suppressed when the voice 5 of the interpreter is detected by the caller voice suppressing function. Consequently, the caller and the callee can understandgrasp the details of the interpretation even when the speech of the interpreter overlaps. This makes it possible to provide quick and precise telephone interpretation services.

10       The — Incidentally, the suppression covers both of the  
cases where the voice signal is turned down to some audible level and where it is turnedshtet off entirely.completely. The unnecessary side voice suppressing function also applies to a  
the case where the voice of the interpreter is switched and  
15 transmitted to either one of the caller and the callee.

AccordingA telephone interpretation system according to a  
second preferred embodiment of the present invention, a  
telephone interpretation system claim 2 is providedone for  
interpreting a call between a caller and a callee who speak  
20 different languages through an interpreter. The telephone interpretation system includeseomprises connecting means for connecting a caller terminal, a callee terminal, and an interpreter terminal, and communication means for conducting voice communications among the terminals connected by the  
25 connecting means. The communication means includeshas a first

voice transmission function of switching between a voice from the callee terminal and a voice from the interpreter terminal and transmitting the resultant to the caller terminal, a second voice transmission function of switching a voice from 5 the caller terminal and the voice from the interpreter terminal and transmitting the resultant to the callee terminal, and a third voice transmission function of synthesizing the voice from the caller terminal and the voice from the callee terminal and transmitting the resultant to the interpreter 10 terminal. The telephone interpretation system further includeshas an unnecessary side voice suppressing function of suppressing an unnecessary voice, either the voice from the interpreter terminal to be supplied to the first voice transmission function or the voice from the interpreter 15 terminal to be supplied to the second voice transmission function, by a command from the interpreter terminal. The first voice transmission function includeshas a function of intercepting the voice from the callee terminal and transmitting the voice from the interpreter terminal when the 20 voice from the interpreter terminal is detected. The second voice transmission function includeshas a function of intercepting the voice from the caller terminal and transmitting the voice from the interpreter terminal when the voice from the interpreter terminal is detected.

25 According to this preferred embodiment of the present

invention, the unnecessary side voice suppressing function suppresses the transmission of the voice of the interpreter to an unnecessary side, either the caller or the callee, by a the command from the interpreter terminal. In addition, the voice 5 of the callee in the original language is switched to the voice of the interpreter when the voice of the interpreter is detected by the first voice transmission function. The voice of the caller in the original language is switched to the voice of the interpreter when the voice of the interpreter is 10 detected by the second voice transmission function.

Consequently, the caller and the callee can understandgrasp the details of the interpretation even when the speech of the interpreter overlaps. This makes it possible to provide quick and precise telephone interpretation services.

15 The unnecessary side voice suppressing function also applies to the situationease where the voice of the interpreter is switched and transmitted to either one of the caller and the callee.

According to a third preferred embodiment of the present  
20 invention, a telephone interpretation system is provided—A  
~~telephone interpretation system according to claim 3 is one~~  
for interpreting a call between a caller and a callee who speak different languages through an interpreter. The telephone interpretation system includes ~~comprises~~ connecting 25 means for connecting a caller terminal, a callee terminal, and

an interpreter terminal, and communication means for  
conducting voice communications among the terminals connected  
by the connecting means. The communication means includes~~s~~ a  
first voice transmission function of multiplexing a voice from  
5 the callee terminal and a voice from the interpreter terminal  
and transmitting the resultant to the caller terminal, a  
second voice transmission function of multiplexing a voice  
from the caller terminal and the voice from the interpreter  
terminal and transmitting the resultant to the callee terminal,  
10 and a third voice transmission function of multiplexing the  
voice from the caller terminal and the voice from the callee  
terminal and transmitting the resultant to the interpreter  
terminal. The telephone interpretation system further  
includes~~s~~ an unnecessary side voice suppressing function of  
15 suppressing an unnecessary voice, either the voice from the  
interpreter terminal to be supplied to the first voice  
transmission function or the voice from the interpreter  
terminal to be supplied to the second voice transmission  
function, by a command from the interpreter terminal.

20 According to this preferred embodiment of the present  
invention, the unnecessary side voice suppressing function  
suppresses the transmission of the voice of the interpreter to  
an unnecessary side, either the caller or the callee, by a ~~the~~  
command from the interpreter terminal. In addition, the voice  
25 of the callee in the original language and the voice of the

interpreter are multiplexed and transmitted to the caller by the first voice transmission function. The voice of the caller in the original language and the voice of the interpreter are multiplexed and transmitted to the callee by the second voice

5 transmission function. Consequently, even when the speech of the interpreter overlaps, the caller and the callee can understandgrasp the details of the interpretation by selecting and listening to the voice of the interpreter fromout of the voices that are received. This makes it possible to provide

10 quick and precise telephone interpretation services.

The unnecessary side voice suppressing function also applies to the situationease where the voice of the interpreter is switched and transmitted to either one of the caller and the callee.

15 InThe telephone interpretation system according to claim  
4is the telephone interpretation system according to the  
first to third preferred embodiments described above,any one  
of claims 1 to 3, wherein the communication means preferably  
includeshas a function of recording the voice from the caller  
20 terminal, the voice from the callee terminal, and the voice  
from the interpreter terminal, and a function of reproducing  
and transmitting the recorded voices uponby request from the  
terminals.

Consequently, the voices of the caller, the callee, and  
25 the interpreter are recorded during interpretation services,

and the recorded contents are reviewed upon ~~and be checked by~~  
request from the terminals. It is therefore possible to review  
the interpretation~~eheck again what was unclear at a later~~  
~~time~~~~the scene~~, and to examine the details of the  
5 interpretation services later.

For voice recording, the voices to be transmitted to the caller terminal and the voices to be transmitted to the callee terminal may be recorded in a multiplex manner~~fashion~~. Consequently, in terminals having a voice demultiplexing  
10 function, the language of the caller and the language of the callee can be separated and reviewed~~echecked~~ for the contents  
thereof.

Alternatively, the voices to be transmitted to the caller terminal and the voices to be transmitted to the callee terminal may be recorded separately such~~so~~ that the voices of  
15 a side designated by a command from the terminals are~~is~~ reproduced for transmission. Consequently, even in terminals which do not include ~~a~~ having the voice demultiplexing  
function, the language of the caller and the language of the  
20 callee can be ~~checked~~ separately reviewed for the contents  
thereof.

In~~The~~ telephone interpretation system according to claim  
5 ~~is~~ the telephone interpretation system according to the  
first to third preferred embodiments described above, any one  
25 ~~of~~ claims 1 to 4, wherein the connecting means preferably

includes~~has~~ an interpreter registration table  
including~~e~~containing at least the language types that the  
possible for interpreters can to interpret and terminal  
numbers of the interpreters. The telephone interpretation  
5 system includes~~has~~ a function of accepting a call from the  
caller terminal,~~+~~ a function of acquiring a terminal number of  
the callee, the language type of the callee, and the language  
type of the caller from the caller terminal of which the call  
is accepted,~~+~~ a function of extracting the terminal number of  
10 an interpreter by referencing the interpreter registration  
table based on the language type of the callee and the  
language type of the caller acquired,~~+~~ a function of calling  
the interpreter terminal ~~by~~ using the acquired terminal number  
of the interpreter,~~+~~ and a function of calling the callee  
15 terminal by using the acquired terminal number of the callee.

Consequently, based on a call from the caller terminal,  
the terminal number of an interpreter who can interpret  
between the language of the caller and the language of the  
callee is extracted from the interpreter registration table.  
20 Then, the caller terminal, the callee terminal, and the  
interpreter terminal are connected automatically before voice  
communications to be interpreted ~~necessary for interpretation~~  
are conducted. Since the caller need not search~~look~~ for an  
interpreter nor negotiate with the callee in advance, it is  
25 possible to provide telephone interpretation services which

are suitable capable of emergency responses. In addition.  
Besides, interpreters can provide interpreting services serve  
from anywhere as long as they can be called. The time required  
by~~—The binding hours~~ of the interpreters can thus be minimized  
5 to reduce the cost of the interpretation services.

According to a fourth preferred embodiment of the present  
invention, a telephone interpretation system is provided—A  
~~telephone interpretation system according to claim 6 is one~~  
for interpreting a call between a caller and callee who speak  
10 different languages through a first interpreter who interprets  
the language of the callee into the language of the caller and  
a second interpreter who interprets the language of the caller  
into the language of the callee. The telephone interpretation  
system includes~~comprises~~ connecting means for connecting a  
15 caller terminal, a callee terminal, a first interpreter  
terminal, and a second interpreter terminal, and communication  
means for conducting voice communications among the terminals  
connected by the connecting means. The communication means  
includes~~has~~ a first voice transmission function of  
20 synthesizing a voice from the callee terminal and a voice from  
the first interpreter terminal and transmitting the  
~~result~~resultant to the caller terminal, a second voice  
transmission function of synthesizing a voice from the caller  
terminal and the voice from the second interpreter terminal  
25 and transmitting the ~~result~~resultant to the callee terminal, a

third voice transmission function of transmitting at least the voice from the callee terminal to the first interpreter terminal, and a fourth voice transmission function of transmitting at least the voice from the caller terminal to the second interpreter terminal. The first voice transmission function includes~~s~~ has a callee voice suppressing function of suppressing the voice from the callee terminal when the voice from the first interpreter terminal is detected. The second voice transmission function includes~~s~~ has a caller voice suppressing function of suppressing the voice from the caller terminal when the voice from the second interpreter terminal is detected.

According to this preferred embodiment of the present invention, the transmission of the voice of the callee in the original language to the caller is suppressed when the voice of the first interpreter is detected by the callee voice suppressing function. The transmission of the voice of the caller in the original language to the callee is suppressed when the voice of the second interpreter is detected by the caller voice suppressing function. Consequently, the caller and the callee can understand~~s~~ grasp the details of the interpretation even when the speeches of the respective interpreters overlap. This makes it possible to provide quick and precise telephone interpretation services.

The —Incidentally, the suppression covers both of the

situationseases where the voice signal is turned down to some audible level and where it is turnedshut off entirelycompletely.

According to a fifth preferred embodiment of the present invention, a telephone interpretation system is provided. A telephone interpretation system according to claim 7 is one for interpreting a call between a caller and callee who speak different languages through a first interpreter who interprets the language of the callee into the language of the caller and a second interpreter who interprets the language of the caller into the language of the callee. The telephone interpretation system includescomprises connecting means for connecting a caller terminal, a callee terminal, a first interpreter terminal, and a second interpreter terminal, and communication means for conducting voice communications among the terminals connected by the connecting means. The communication means includeshas a first voice transmission function of switching between a voice from the callee terminal and a voice from the first interpreter terminal and transmitting the resultant to the caller terminal, a second voice transmission function of switching between a voice from the caller terminal and a voice from the second interpreter terminal and transmitting the resultant to the callee terminal, a third voice transmission function of transmitting at least the voice from the callee terminal to the first interpreter terminal, and a fourth voice

transmission function of transmitting at least the voice from the caller terminal to the second interpreter terminal. The first voice transmission function includes~~s~~ has a function of interrupting the voice from the callee terminal and

5 transmitting the voice from the first interpreter terminal when the voice from the first interpreter terminal is detected. The second voice transmission function includes~~s~~ has a function of interrupting the voice from the caller terminal and transmitting the voice from the second interpreter terminal

10 when the voice from the second interpreter terminal is detected.

According to this preferred embodiment of the present invention, the voice of the callee in the original language is switched to the voice of the first interpreter when the voice of the first interpreter is detected by the first voice transmission function. The voice of the caller in the original language is switched to the voice of the second interpreter when the voice of the second interpreter is detected by the second voice transmission function. Consequently, the caller and the callee can understand~~s~~ grasp the details of the interpretation even when the speeches of the respective interpreters overlap. This makes it possible to provide quick and precise telephone interpretation services.

According to a sixth preferred embodiment of the present invention, a telephone interpretation system is provided—A

~~telephone interpretation system according to claim 8 is one~~

for interpreting a call between a caller and callee who speak different languages through a first interpreter who interprets the language of the callee into the language of the caller and

5 a second interpreter who interprets the language of the caller into the language of the callee. The telephone interpretation system includes~~comprises~~ connecting means for connecting a caller terminal, a callee terminal, a first interpreter terminal, and a second interpreter terminal, and

10 communication means for conducting voice communications among the terminals connected by the connecting means. The communication means includes~~has~~ a first voice transmission function of multiplexing a voice from the callee terminal and a voice from the first interpreter terminal and transmitting

15 the resultant to the caller terminal, a second voice transmission function of multiplexing a voice from the caller terminal and a voice from the second interpreter terminal and transmitting the resultant to the callee terminal, a third voice transmission function of transmitting at least the voice

20 from the callee terminal to the first interpreter terminal, and a fourth voice transmission function of transmitting at least the voice from the caller terminal to the second interpreter terminal.

According to this preferred embodiment of the present  
25 invention, the voice of the callee in the original language

and the voice of the first interpreter are multiplexed and transmitted to the caller by the first voice transmission function. The voice of the caller in the original language and the voice of the second interpreter are multiplexed and

5 transmitted to the callee by the second voice transmission function. Consequently, even when the speeches of the respective interpreters overlap, the caller and the callee can understandgrasp the details of the interpretation by selecting and listening to the voices of the interpreters out of the

10 voices received. This makes it possible to provide quick and precise telephone interpretation services.

~~InThe telephone interpretation system according to claim 9 is the telephone interpretation system according to fourth to sixth preferred embodiments, any one of claims 6 to 8, wherein the communication means preferably includes has a function of recording the voice from the caller terminal, the voice from the callee terminal, the voice from the first interpreter terminal, and the voice from the second interpreter terminal, and a function of reproducing and transmitting the recorded voices by request from the terminals.~~

Consequently, the voices of the caller, the callee, the first interpreter, and the second interpreter are recorded during interpretation services, and the recorded contents can be reviewedcheckeek by request from the terminals. It is

25 therefore possible to review the interpretation servicescheck

~~again what was unclear at a later time~~ the scene, and examine the details of the interpretation services later.

For voice recording, the voices to be transmitted to the caller terminal and the voices to be transmitted to the callee 5 terminal may be recorded in a multiplex manner.fashion.

Consequently, in terminals having a voice demultiplexing function, the language of the caller and the language of the callee can be ~~checked~~ separately reviewed for the contents.

Alternatively, the voices to be transmitted to the caller 10 terminal and the voices to be transmitted to the callee terminal may be ~~recorded~~ separately recorded such that the voices of a side designated by a command from the terminals are is reproduced for transmission. Consequently, even in terminals which do not include a having the voice 15 demultiplexing function, the language of the caller and the language of the callee can be ~~checked~~ separately reviewed for the contents.

InThe telephone interpretation system according to claim 20 is the telephone interpretation system according to fourth to sixth preferred embodiments, any one of claims 6 to 9, wherein the connecting means preferably includes ~~has~~ an interpreter registration table including containing at least the language types that the possible for interpreters can to interpret and terminal numbers of the interpreters. The 25 telephone interpretation system preferably further includes ~~has~~

a function of accepting a call from the caller terminal,, a  
function of acquiring a terminal number of the callee, the  
language type of the callee, and the language type of the  
caller from the caller terminal of which the call is  
5 accepted,, a function of extracting the terminal number of the  
first interpreter by referencing the interpreter registration  
table based on the language type of the callee and the  
language type of the caller acquired,, a function of calling  
the first interpreter terminal by using the acquired terminal  
10 number of the first interpreter,, a function of extracting the  
terminal number of the second interpreter by referencing the  
interpreter registration table based on the language type of  
the caller and the language type of the callee acquired,, a  
function of calling the second interpreter terminal by using  
15 the acquired terminal number of the second interpreter,, and a  
function of calling the callee terminal by using the acquired  
terminal number of the callee.

Consequently, based on a call from the caller terminal,  
the terminal numbers of the first interpreter who interprets  
20 the language of the callee into the language of the caller and  
the second interpreter who interprets the language of the  
caller into the language of the callee are extracted from the  
interpreter registration table. Then, the caller terminal, the  
callee terminal, the first interpreter terminal, and the  
25 second interpreter terminal are connected automatically before

voice communications to be interpreted necessary for interpretation are conducted. Since the caller need not searchlook for interpreters nor negotiate with the callee in advance, it is possible to provide telephone interpretation services suitable for capable of emergency responses. In addition, Besides, the interpreters can provide interpreting services from anywhere as long as they can be called. The time required by The binding hours of the interpreters can thus be minimized to reduce the cost of the interpretation services.

InThe telephone interpretation system according to claim 11 is the telephone interpretation system according to fourth to sixth preferred embodiments, claim 5 or 10, wherein the interpreter registration table preferably includes contains selection information for selecting interpreters, and the connecting means includes has a function of acquiring an interpreter selection condition from the caller terminal, and a function of retrieving the terminal number(s) of an appropriate interpreter(s) by referencing the interpreter registration table based on the interpreter selection condition acquired.

This makes it possible to select an interpreter or interpreters suited to the purpose of the conversation between the caller and the callee, out of those who are registered in the interpreter registration table. The selection information

for selecting interpreters includes include information on gender, age, residence, the fields of specialization, qualifications, and other useful information.

If the interpreter registration table includes contains 5 the language-specific interpretation levels of the interpreters, users can select interpreters of levels desirable for interpretation between intended languages. Meanwhile, the interpreters can register for a number of different languages that they speak. This provides for allows 10 flexible, efficient selection of interpreters.

For the telephone interpretation system with bidirectional simultaneous interpretation, the levels of listening comprehension and those of speaking abilities may be registered separately as the language-specific interpretation 15 levels in the interpreter registration table. This makes it possible to select persons that are the most suitable for the first interpreter and the second interpreter individually, which provides for allowing more flexible efficient selection of interpreters.

20 InThe telephone interpretation system according to claim 12 is the telephone interpretation system according to fourth to sixth preferred embodiments, any one of claims 5, 10, and 11, wherein the interpreter registration table preferably includes contains availability flags for indicating whether or 25 not the interpreters are available, and the connecting means

includes~~has~~ a function of extracting the terminal number(s) of an available interpreter(s) by referencing the availability flags in the interpreter registration table.

The interpreters can thus register their availabilities 5 into the interpreter registration table such~~se~~ that available interpreters are automatically selected and called. This ~~eliminates~~~~an~~ preclude needless calls, and provides~~provide~~ more flexible efficient telephone interpretation services.

In~~The~~ ~~telephone interpretation system according to claim~~  
10 ~~13~~ is the telephone interpretation system according to fourth  
to sixth preferred embodiments, any one of claims 5, 10, 11,  
~~and 12, wherein:~~ the interpreter registration table preferably  
includes~~contains~~ accounting information on the interpreters,  
and the connecting means includes~~has~~ a function of measuring  
15 the time for the caller terminal or callee terminal to receive  
interpretation services, and a function of calculating fees  
from the measured time and the accounting information  
registered in the interpreter registration table.

Since the interpreter registration table includes~~contains~~  
20 the accounting information on the interpreters, it is possible  
to charge correct fees for the telephone interpretation  
services.

Here, the interpreter registration table preferably  
includes~~may contain~~ the language-specific interpretation  
25 levels of the interpreters such~~se~~ that the accounting

information is obtained by using an accounting table which is provided separately and defines the relationship between the interpretation levels and hourly rates. Consequently, it is possible to charge correct fees in accordance with the levels  
5 of the interpreters.

~~Other~~The above object, other objects, features, elements, steps, characteristics and advantages of the present invention will become more apparent from the following detailed description of preferred embodiments thereof with reference to  
10 ~~the attached~~ embodiments of the invention made in conjunction with the drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a system block diagram showing a telephone  
15 interpretation system according to a first preferred embodiment of the present invention;

Fig. 2 is a chart showing an example of an interpreter registration table in the telephone interpretation system according to the first preferred embodiment of the present  
20 invention;

Fig. 3 is a process flowchart showing the connection processing by a control unit in the telephone interpretation system according to the first preferred embodiment of the present invention;

25 Fig. 4 is a system block diagram showing the telephone

interpretation system according to a second preferred  
embodiment of the present invention;

Fig. 5 is a chart showing an example of the interpreter  
registration table in the telephone interpretation system  
5 according to the second preferred embodiment of the present  
invention;

Fig. 6 is a process flowchart showing the connection  
processing by the control unit in the telephone interpretation  
system according to the second preferred embodiment of the  
10 present invention;

Fig. 7 is a block diagram showing a practical example of  
a voice communication function in the telephone interpretation  
system according to the first preferred embodiment of the  
present invention;

15 Fig. 8 is a block diagram showing another practical  
example of the voice communication function in the telephone  
interpretation system according to the first preferred  
embodiment of the present invention;

Fig. 9 is a block diagram showing a practical example of  
20 the voice communication function in the telephone  
interpretation system according to the second preferred  
embodiment of the present invention;

Fig. 10 is a block diagram showing another practical  
example of the voice communication function in the telephone  
25 interpretation system according to the second preferred

embodiment of the present invention;

Fig. 11 is a block diagram showing a practical example of a recording and reproducing function in the telephone interpretation system according to the first preferred embodiment of the present invention; and

Fig. 12 is a block diagram showing a practical example of the recording and reproducing function in the telephone interpretation system according to the second preferred embodiment of the present invention.

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#### DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

##### ~~BEST MODE FOR CARRYING OUT THE INVENTION~~

Fig. 1 is a system block diagram showing a telephone interpretation system according to a preferred embodiment of the present invention. In the diagram, the reference numeral 100 designates the telephone interpretation system which is installed in an interpretation center for providing interpretation services. The telephone interpretation system connects a telephone terminal 10 to be used by a caller (hereinafter, referred to as caller terminal), a telephone terminal 20 to be used by a callee (hereinafter, referred to as callee terminal), and a telephone terminal 30 to be used by an interpreter (hereinafter, referred to as interpreter terminal) via public telephone lines 40, to providethus

provides telephone interpretation services by having the interpreter interpret a telephone conversation between the caller and the callee by telephone.

The following description will describe a deal with the  
5 case in which~~where~~ the caller terminal 10, the callee terminal 20, and the interpreter terminal 30 are use-cellular phones with head sets 10d, 20d, and 30d for inputting and outputting voices plugged into respective voice input jacks. It is possible, however, to use ordinary fixed phones. Voices may  
10 also be input and output directly by using ordinary handsets.

The telephone interpretation system 100 includes~~comprises~~ a caller terminal line interface (hereinafter, "interface" will be abbreviated as I/F) 120, a callee terminal line I/F 140, and an interpreter terminal line I/F 160 for establishing  
15 connection with the caller terminal, the callee terminal, and the interpreter terminal, respectively. The line I/Fs are connected with voice input and output units 122, 142, and 162 for inputting and outputting voices to/from the respective terminals.

20 The voice input of the caller terminal voice input and output unit 122 is connected with a voice synthesis unit 124 which synthesizes the voice output of the callee terminal voice input and output unit 142, the voice output of the interpreter terminal voice input and output unit 162, and the  
25 voice output of a caller terminal voice telop memory 126. The

voice input of the callee terminal voice input and output unit 142 is connected with a voice synthesis unit 144 which synthesizes the voice output of the caller terminal voice input and output unit 122, the voice output of the interpreter terminal voice input and output unit 162, and the voice output of a callee terminal voice telop memory 146.

The voice input of the interpreter terminal voice input and output unit 162 is connected with a voice synthesis unit 164 which synthesizes the voice output of the caller terminal voice input and output unit 122, the voice output of the callee terminal voice input and output unit 142, and the voice output of an interpreter terminal voice telop memory 166.

Here, the voice output of the interpreter terminal voice input and output unit 162 is input to a switch 168. A PB detector 169 detects a command from the interpreter terminal. When the interpreter interprets the language of the callee into the language of the caller, the voice output is supplied to the caller terminal voice synthesis unit 124. When the interpreter interprets the language of the caller into the language of the callee, the voice output is supplied to the callee terminal voice synthesis unit 144. Consequently, the voice of the interpreter is transmitted to either one of the caller and the callee as required.~~who is in need~~. This prevent ~~an~~ prevent the speech of the caller or the callee from being interrupted by an unnecessary voice of the

interpreter, thereby enabling~~allowing~~ smooth conversation.

The caller terminal voice synthesis unit 124 includes~~has~~ the function of suppressing the voice level of the callee terminal or switching the voice from the callee terminal to 5 the voice from the interpreter terminal when the voice from the interpreter terminal is detected. The callee terminal voice synthesis unit 144 includes~~has~~ the function of suppressing the voice level of the caller terminal or switching the voice from the caller terminal to the voice from 10 the interpreter terminal when the voice from the interpreter terminal is detected. This prevent~~sean prevent~~ the interpreting voice of the interpreter from overlapping with the voice of the other party at the caller terminal or callee terminal, thereby preventing~~avoiding~~ poor audibility. The 15 interpreter can thus conduct simultaneous interpretation of the speeches of the speakers to provide quick and precise interpretation.

Fig. 7 shows a specific example of the function of switching the destination of the interpreter voice in the 20 switch 168 and the functions of suppressing the caller voice or callee voice in the voice synthesis units 124 and 144. As shown in the diagram, the voice output of the interpreter terminal voice input and output unit 162 is connected to a caller terminal voice signal adder 190 and a callee terminal 25 voice signal adder 193 via the switch 168. The voice of the

interpreter is thus supplied to either the caller or the callee depending upon the signal from the PB detector 169. From a data signal or tone signal included in the voice from the interpreter terminal, the PB detector 169 detects that a 5 predetermined caller selection number or callee selection number is pressed on a dial pad of the terminal. The PB detector 169 then switches turns the switch 168 to the designated side. For this purpose, the interpreter designates which side the interpreting voice is targeted for, the caller 10 or the callee, from the dial pad before he/she speaks.

Consequently, the voice of the interpreter will not be transmitted to the caller or callee who does need not need to hear the voice of the interpreter.

Now, the caller terminal voice signal adder 190 is also 15 connected with the voice output of the callee terminal voice input and output unit 142 via an attenuator 191. The attenuator 191 attenuates the voice from the callee terminal when the voice of the interpreter is detected by a signal detector 192. The callee terminal voice signal adder 193 is 20 also connected with the voice output of the caller terminal voice input and output unit 122 via an attenuator 194. The attenuator 194 attenuates the voice from the caller terminal when the voice of the interpreter is detected by a signal detector 195. Here, the signal detectors 192 and 195 are set 25 to appropriate detection levels so as to prevent the voices of

the other parties from accidental attenuation due to noise or  
other outside sounds~~the like.~~

Incidentally, appropriate signal delay units may be arranged on the interpreter's voice inputs to the voice signal adders 190 and 193. This ensure~~sean make sure~~ that the caller and the callee hear the voice of the interpreter immediately after the voice of the interpreter is detected by the signal detectors 192 and 195.

In the foregoing example, the voices of the other parties are attenuated by the attenuators 191 and 194 such~~se~~ that the caller or callee hears the live voice of the other party at some audible level while listening to the voice of the interpreter. Nevertheless, the voices of the other parties may be turned ~~shut~~-off entirely~~completely~~ by using switches.

Fig. 8 shows a practical example in which the voices of the other parties are turne~~shut~~-off and the voice of the interpreter alone is transmitted when the voice of the interpreter is detected. As shown in the diagram, switches 197 and 198 are used instead of the voice signal adders 190 and 193 described above. When the voice of the interpreter is detected by the signal detectors 192 and 195, the switches 197 and 198 are switched ~~turne~~-from the voices of the other parties to the voice of the interpreter. In other respects, the configuration is the same as in Fig. 7.

Again, appropriate signal delay units may be arranged on

the interpreter's voice inputs to the switches 197 and 198 so as to make sure that the caller and the callee hear the voice of the interpreter immediately after the voice of the interpreter is detected by the signal detectors 192 and 195.

5       The foregoing example describes a situation in which~~has~~  
dealt with the ease where the voice signal adders 190 and 193 each simply add the voice of the interpreter and the voice of the other party~~simply~~. Nevertheless, the two signals may be multiplexed. For example, if the terminals are stereo-sound  
10 compatible, the voice of the other party and the voice of the interpreter are stereophonically synthesized and transmitted as a left channel and a right channel, respectively. Necessary voices are then selected by the receiving parties on the terminal sides. In this case, the telephone interpretation  
15 system need not be provided with the attenuators for attenuating the voices of the other parties. The receiving parties can adjust the loudness levels of the right and left channels across the headsets separately depending on the circumstances.

20       The foregoing examples describe situations in which~~have~~  
dealt with the eases where the switch 168 is used to switch the destination of the voice of the interpreter between the caller and the callee. Nevertheless, the voice of the interpreter may be supplied to both the voice signal adder 190  
25 (or switch 197) and the voice signal adder 193 (or switch 198)

through respective attenuators suchse that the voice signal to the unnecessary party is attenuated by the PB detector 169. When the attenuators are used~~thus~~, the voice of the interpreter is transmitted to the speakers at some level. The 5 speakers can thus speak while checking whetherif their own voices are being interpreted.

The telephone interpretation system 100 includes a control unit 110 having an interpreter registration table 112 into which the terminal numbers of interpreter terminals to be 10 used by interpreters are registered. The control unit 110 is connected with each of the line I/Fs 120, 140, and 160, the voice input and output units 122, 142, and 162, the voice synthesis units 124, 144, and 164, and the telop memories 126, 146, and 166. The control unit 110 provides functions for 15 connecting the caller terminal, the callee terminal, and the interpreter terminal. The functions include~~s~~ accepting a call from the caller terminal,~~s~~ acquiring the language type of the caller and the language type of the callee,~~s~~ acquiring an interpreter selection condition,~~s~~ extracting the terminal 20 number of the interpreter by referencing the interpreter registration table 112 based on the language types and the selection condition acquired,~~s~~ calling the interpreter terminal by using the terminal number extracted,~~s~~ acquiring the terminal number of the callee,~~s~~ and calling the callee 25 terminal by using the terminal number acquired.

The inputs of the voice synthesis units 124, 144, and 164 are connected to with the caller terminal voice telop memory 126, the callee terminal voice telop memory 146, and the interpreter terminal voice telop memory 166, respectively. The 5 contents of the voice telop memories 126, 146, and 166 can be set by the control unit 110. Consequently, when holding a telephone conversation through an interpreter, it is possible to transmit necessary voice messages to the individual terminals and establish a three-party call by setting the 10 voice telop memories 126, 146, and 166 with messages for the respective terminals, and issuing commands to select the signals of the voice telop memories 126, 146, and 166 to the respective voice synthesis units 124, 144, and 164.

Next, description will be given of the connection 15 processing by the control unit 110 for holding a telephone conversation through an interpreter.

Prior to the processing, interpreter selection information and the terminal numbers of the terminals to be used by respective interpreters are registered in the 20 interpreter registration table 112 of the control unit 110 from an appropriate terminal (not shown). Fig. 2 shows examples of entry items to be registered into the interpreter registration table 112. The interpreter selection information is information for selecting interpreters that are desired by 25 users, and includes such entries as gender, age, language

capabilities, residence, and the fields of specialization. For language capabilities, the language-specific levels of the interpreters are registered suchse that the users can select interpreters of desired levels in both intended languages.

5 Here, the advanced, intermediate, and primary levels of interpretation are expressed as 1, 2, and 3, respectively. The entries on the residence are made on the assumption that some users may desire persons who have geographic knowledge on certain areas. Zip code is used here for area specification.

10 The entries regardingen the fields of specialization are made on the assumption that some users may desire persons who have specialized knowledge on a field or are well informed in topics of the field when the conversation will deal with the field of specialization. Here, the specialized fields of the

15 interpreters mayean be registered in such subsections as politics, law, business, education, science and technology, medical, linguistics, sports, and hobbies. Since the fields of specialization range widely, hierarchical entries may be made in advance suchse that the entries are searched ininte levels

20 desired by users at the time of selection.

Alternatively, qualifications possessed by the individual interpreters may be registered suchse that interpreters who carry qualifications desired by the users can be selected.

For the terminal numbers, the telephone numbers of the

25 terminals are registered since the target terminals are

telephone terminals to be connected to public telephone lines.

The interpreter registration table 112 also includes~~contains~~ availability flags for indicating whether the corresponding interpreters are available or not. Registered  
5 interpreters ~~can~~ call the interpretation center from their own terminals and input commands from their dial pads to set or reset their availability flags. Consequently, the registered interpreters ~~can~~ avoid unnecessary calls by setting their availability flags in the interpreter registration table only  
10 when they are available. With the availability flags, the ~~The~~ users can also select available interpreters quickly.

Fig. 3 shows the process flow chart of the connection process~~processing~~ by the control unit 110. The telephone interpretation system 100 accepts an order for interpretation  
15 services when the caller calls the telephone number of the caller terminal line I/F. The telephone interpretation system 100 then calls an interpreter terminal and a callee terminal, and establishes connection for the telephone interpretation services.

20 As shown in the flow chart, the presence of a call to the caller terminal line I/F 120 is detected initially-(S100). When a call is detected, a message for requesting an ~~to~~-input of the language type of the caller is output to the caller terminal (S102). This is performed~~effected~~ by providing~~setting~~  
25 the caller voice telop memory 126 with voice messages such as

"If you speak Japanese, please press 1#" (in Japanese), "If you speak English, please press 2#", ... . Subsequent messages to the caller terminal and the interpreter terminal will be provided~~given~~ in the selected ~~acquired~~ language type of the 5 caller. The language type of the caller, input by the caller ~~in response~~, is ~~acquired~~ thus ~~acquired~~ (S104).

Next, a message for requesting an ~~to~~-input of the language type of the callee is output to the caller terminal (S106). For example, if the caller is a-Japanese, the message 10 is output~~given~~ by providing~~setting~~ the callee voice telop memory 126 with voice messages such as "If the language of the callee is English, press 1#. If German, press 2#. ..." (in Japanese). The language type of the callee, input by the caller ~~in response~~, is ~~acquired~~ thus ~~acquired~~ (S108). As a 15 result, messages to the callee terminal will be provided~~given~~ in the acquired language type of the callee.

Now, a message for requesting an ~~to~~-input of an interpreter selection condition is output to the caller terminal (S110). This is performed~~effected~~ by providing~~setting~~ 20 the caller voice telop memory 126 with voice messages such as "If a male interpreter is desired, press 1#. If female, press 2#. If you do not care, press 0#", "If an interpreter under the age of 20 is desired, press 1#. For 20 to 39, press 2#. For 40 and above, 3#. If you do not care, press 0#", "If any 25 area specification is desired, press zip code and #. If not,

press 0#", "To specify the fields of specialization, press 1 for politics, 2 for law, 3 for business, 4 for education, 5 for science and technology, ... . Press # in conclusion", and "To specify interpretation level, press 1# for advanced, 2# 5 for intermediate, and 3# for primary. If you do not care, press 0#". The interpreter selection condition input by the caller ~~in response is acquired thus acquired~~ (S112).

Next, the interpreter registration table 112 is referenced~~referred~~ to select an interpreter who has the 10 specified interpretation level in the language of the caller and the language of the callee, matches with the acquired selection condition including gender, age, residence, and/or the fields of specialization, and has his/her availability flag set (S114). Here, registration information on the 15 selected interpreter may be provided~~notified~~ via a voice message such~~as~~ that the caller makes a final selection of an ~~on the~~ interpreter. In addition, the hourly rate (to be described later) of the interpreter, registered in the interpreter registration table 112, may be provided~~notified~~ 20 via a voice message. This enables~~allows~~ the users to select appropriate interpreters in viewe~~on~~ consideration of the fees required~~necessary~~ for the interpretation services.

Next, the terminal number of the selected interpreter is extracted from the interpreter registration table 112 and 25 called (S116). Here, the interpreter terminal may be notified

of personal information about~~on~~ the caller, the language types of the caller and callee, the interpreter selection condition, and other information ~~the like by~~ using the interpreter terminal voice telop memory 166. Whether or not to accept the request for interpretation can be performed~~checked~~ in this manner~~way~~. For example, the personal information about~~on~~ the caller may be member information registered in advance, provided that the interpretation services are offered on a membership basis. When the interpreter terminal accepts~~has-~~ accepted the call (S118), a message ~~for~~ requesting ante input of the terminal number of the callee is output to the caller terminal (S120). This is performed by ~~providing~~~~effected~~ by setting the caller voice telop memory 126 with a voice message such as "Press the telephone number of the callee and #". The terminal number of the callee that is, input by the caller ~~in-~~ response, is thus acquired and called (S122). Here, the callee terminal may also be notified of the personal information of~~on~~ the caller, the language types of the caller and callee, the interpreter selection condition, and other information~~the like~~ by using the callee terminal voice telop memory 146. Whether or not to accept the call, and the presence or absence of errors in the selection condition can be checked in this manner~~way~~.

When the callee terminal has accepted the call (S124), the telephone interpretation services are started (S126).

If In case the selected interpreter terminal does not accept the call in S118, whether a next candidate is available is determined (S128). If In case a next candidate is available, the processing returns to S114 and is repeated.

- 5 Otherwise, the caller terminal is notified that there is no next candidate, as such and the call is released (S130). If In case the callee terminal does not accept the call in S124, the caller terminal and the interpreter terminal are notified as such and the calls are released (S134).

- 10 The control unit 110 includes has a timer (not shown) for calculating the fee for the interpretation services. The timer measures the time from the beginning of a connection to the disconnection. The interpreter registration table 112 includes contains entries about on the hourly rates of the interpreters (not shown). At the end of interpretation services, the fee is calculated based on from the time measured by the timer and the hourly rates registered in the interpreter registration table 113. The calculated fee is registered in into an accounting database 114, and charged to the user at a later time.
- 15
- 20

The — In identally, the hourly rates of the interpreters may be determined from the interpretation levels registered in the interpreter registration table 112, by referencing a separately provided an accounting table provided separately.

- 25 Here, the accounting table defines shall define the

relationship between the interpretation levels of the interpreters and the associated hourly rates.

The foregoing preferred embodiment describes a configuration in which has dealt with the ease where if the  
5 interpreter terminal selected does not accept the call, and an appropriate message is simply posted to the caller before disconnection. AlternativelyNevertheless, an interpretation reservation table for registering the terminal number of the caller and the terminal number of the callee may be provided  
10 such so that the caller and the callee are can be notified to start of the telephone interpretation service when the selected interpreter accepts the call.

The foregoing preferred embodiment describes a configuration in which has dealt with the ease where the caller  
15 enters the language type of the caller and the language type of the callee for the sake of selecting an interpreter.

HoweverNevertheless, the language type of the caller or callee may be acquired automatically by providing the interpretation center with telephone numbers for respective caller languages  
20 or respective combinations of caller languages and callee languages. The foregoing preferred embodiment describes a situation in which has also dealt with the ease where the caller enters the interpreter selection condition for the sake of selecting an interpreter. HoweverNevertheless, whether or  
25 not to specify the interpreter selection condition may be

inquired first. If no specific interpreter selection condition is required initially. If not so specified, an interpreter may be selected based on the entered language types alone.

Moreover, in emergency situations, an interpreter in  
5 charge of emergency response may be called automatically  
~~when~~ by the caller ~~presses~~ apressing certain dial numbers-  
initially.

The foregoing preferred embodiment has describes a  
configuration in which~~dealt with the case where~~ the telephone  
10 interpretation system 100 is defined by the composed of the  
line I/Fs, the voice input and output units, the voice  
synthesis units and, the control unit. However, and so on.  
Nevertheless, these components are~~need~~ not necessarily be  
configured as separate pieces of hardware. The functions of  
15 the units may be achieved by ~~in the form of~~ software  
processing by using a computer.

The foregoing preferred embodiment describes a  
configuration in which~~has dealt with the case where~~ the  
interpreter terminal 30 is located outside the interpretation  
20 center as the caller terminal 10 and the callee terminal 20  
are, and provides interpretation services when called from the  
interpretation center via the public telephone lines. However,  
the present invention is not limited thereto. It is understood  
that some or all of interpreter terminals may be installed in  
25 the interpretation center such ~~so~~ that interpretation services

are provided from the interpretation center.

In incidentally, in the foregoing preferred embodiment, the interpreters can participate in interpretation services from anywhere as long as they have terminals capable of 5 connecting to connection with public telephone lines. The interpreters can thus make effective use of their free time~~unoccupied hours~~ to provide interpretation services by using the availability flags mentioned above. This enables~~allows~~ efficient and stable operation of interpretation 10 services which often have difficulty in securing necessary personnel.

The foregoing preferred embodiment describes a configuration in which~~has dealt with the case where~~ an interpreter is in charge of both interpreting the language of 15 the caller into the language of the callee and interpreting the language of the callee into the language of the caller. However~~Nevertheless~~, a first interpreter for interpreting the language of the callee into the language of the caller and a second interpreter for interpreting the language of the caller 20 into the language of the callee may be selected individually to perform bidirectional simultaneous interpretation.

Fig. 4 shows an example of the system configuration of the telephone interpretation system according to a second preferred embodiment of the present invention for providing 25 bidirectional simultaneous interpretation services. In the

diagram, the reference numeral 200 designates the telephone interpretation system which is installed in an interpretation center for providing bidirectional simultaneous interpretation services. The telephone interpretation system 200 connects a

5 telephone terminal 10 to be used by a caller (hereinafter, referred to as caller terminal), a telephone terminal 20 to be used by a callee (hereinafter, referred to as callee terminal), a telephone terminal 32 to be used by a first interpreter (hereinafter, referred to as first interpreter terminal), and

10 a telephone terminal 34 to be used by a second interpreter (hereinafter, referred to as second interpreter terminal) through public telephone lines 40. The telephone interpretation system 200 provides telephone interpretation services in which ~~by having~~ the first and second interpreters

15 interpret a telephone conversation between the caller and the callee by telephone.

The telephone interpretation system 200 includes ~~has~~ a caller terminal line I/F 220, a callee terminal line I/F 240, a first interpreter terminal line I/F 260, and a second

20 interpreter line I/F 280. The line I/Fs are connected with voice input and output units 222, 242, 262, and 282 for inputting and outputting voices to/from the respective terminals.

The voice input of the caller terminal voice input and

25 output unit 222 is connected to with a voice synthesis unit 224

which synthesizes the voice output of the callee terminal  
voice input and output unit 242, the voice output of the first  
interpreter terminal voice input and output unit 262, and the  
voice output of a caller terminal voice telop memory 226. The  
5 voice input of the callee terminal voice input and output unit  
242 is connected with a voice synthesis unit 244 which  
synthesizes the voice output of the caller terminal voice  
input and output unit 222, the voice output of the second  
interpreter terminal voice input and output unit 282, and the  
10 voice output of a callee terminal voice telop memory 246.

The voice input of the first interpreter terminal voice  
input and output unit 262 is connected to with a voice  
synthesis unit 264 which synthesizes the voice output of the  
callee terminal voice input and output unit 242 and the voice  
15 output of a first interpreter terminal voice telop memory 266.  
The voice input of the second interpreter terminal voice input  
and output unit 282 is connected to with a voice synthesis unit  
284 which synthesizes the voice output of the caller terminal  
voice input and output unit 222 and the voice output of a  
20 second interpreter terminal voice telop memory 286.

Consequently, the voice of the first interpreter is  
transmitted only to the caller, and the voice of the second  
interpreter is transmitted only to the callee. This  
prevent~~s~~an~~an~~prevent the speech of the caller from being  
25 interrupted by the voice of the second interpreter and the

speech of the callee from being interrupted by the voice of the first interpreter, thereby enabling~~allowing~~ smooth conversation.

The caller terminal voice synthesis unit 224  
5 suppresses~~has the function of suppressing~~ the loudness level of the voice from the callee terminal when the voice from the first interpreter terminal is detected. The callee terminal voice synthesis unit 244 suppresses~~has the function of suppressing~~ the loudness level of the voice from the caller terminal when the voice from the second interpreter terminal is detected. This prevent~~sean prevent~~ the voices of the first and second interpreters from overlapping with the voices of the other parties in the caller terminal and the callee terminal, respectively, thereby preventing~~gaveidng~~ poor audibility. The first and second interpreters can thus interpret the speeches of the speakers simultaneously to provide quick and precise interpretations.

Fig. 9 shows a specific example of the suppression~~offunctions of suppressing~~ the callee voice or caller voice in 20 the voice synthesis units 224 and 244. As shown in the diagram, the voice output of the first interpreter terminal voice input and output unit 262 is connected to a caller terminal voice signal adder 290. The voice output of the second interpreter terminal voice input and output unit 282 is connected to a 25 callee terminal voice signal adder 293. This precludes the

caller and the callee caller from receiving unnecessary voices of the second interpreter and the first interpreter, respectively.

The caller terminal voice signal adder 290 is also connected to with the voice output of the callee terminal voice input and output unit 242 via an attenuator 291. The attenuator 291 attenuates the voice from the callee terminal when the voice of the first interpreter is detected by a signal detector 292. The callee terminal voice signal adder 293 is also connected to with the voice output of the caller terminal voice input and output unit 222 via an attenuator 294. The attenuator 294 attenuates the voice from the caller terminal when the voice of the second interpreter is detected by a signal detector 295. Here, the signal detectors 292 and 295 are set to appropriate detection levels so as to prevent the voices of the other parties from accidental attenuation due to noise or other external sounds ~~the like~~.

Appropriate ~~Incidentally~~, appropriate signal delay units are preferably ~~may be~~ arranged on the interpreters' voice inputs to the voice signal adders 290 and 292. This ensures ~~make~~ sure that the caller and callee hear the voices of the interpreters immediately after the voices of the interpreters are detected by the signal detectors 293 and 295.

In the foregoing example, the voices of the other parties are attenuated by the attenuators 291 and 294 such ~~as~~ that the

caller or callee hears the live voice of the other party at a reduced ~~some~~ audible level when listening to the voice of the first or second interpreter. However~~Nevertheless~~, the voices of the other parties may be turned~~shut~~ off entirely~~completely~~ by ~~using~~ switches.

Fig. 10 shows a practical example in which the voices of the other parties are turned~~shut~~ off and the voices of the interpreters alone are transmitted when the voices of the interpreters are detected. As shown in the diagram, switches 296 and 297 are used instead of the voice signal adders 290 and 293 described above. When the voices of the interpreters are detected by the signal detectors 292 and 295, the switches 296 and 297 are turned from the voices of the other parties to the voices of the interpreters. In other respects, the configuration is the same as that shown in Fig. 9.

Appropriate~~Incidentally~~, appropriate signal delay units are preferably~~may be~~ arranged on the interpreters' voice inputs to the switches 296 and 292 so as to make sure that the caller and callee hear the voices of the interpreters immediately after the voices of the interpreters are detected by the signal detectors 292 and 295.

The foregoing example describes a configuration in which~~has dealt with the case where~~ the voice signal adders 290 and 293 each simply add the voice of the interpreter and the voice of the other party. However~~simply~~~~Nevertheless~~, the

two signals may be multiplexed. For example, if the terminals  
are stereo-sound compatible, the voice of the other party and  
the voice of the interpreter are stereophonically synthesized  
and transmitted as the left channel and the right channel,  
5 respectively. Necessary voices are then selected by the  
receiving parties on the terminal sides. In this case, the  
telephone interpretation system need not be provided with the  
attenuators for attenuating the voices of the other parties.  
The receiving parties can adjust the loudness levels of the  
10 right and left channels across the headsets separately  
depending upon the circumstances.

The foregoing preferred embodiment describes a  
configuration in which has dealt with the case where the first  
interpreter only listens only to and interprets the voice of  
15 the callee, and the second interpreter only listens only to  
and interprets the voice of the caller. However Nevertheless,  
the voice of the caller and the voice of the second  
interpreter may be attenuated and added to the voice to be  
transmitted to the first interpreter, or multiplexed into the  
20 same, for transmission. The voice of the callee and the voice  
of the first interpreter may be attenuated and added to the  
voice to be transmitted to the second interpreter, or  
multiplexed into the same, for transmission. In this case, the  
interpreters can conduct interpretation while checking the  
25 progress of the entire conversation and reactions of the other

parties to the ~~of~~-interpretation.

The telephone interpretation system 200 includes a control unit 210 having an interpreter registration table 112 into which the terminal numbers of interpreter terminals to be used by interpreters are registered. The control unit 210 is connected to~~with~~ each of the line I/Fs 220, 240, 260, and 280, the voice input and output units 222, 242, 262, and 282, the voice synthesis units 224, 244, 264, and 284, and the telop memories 226, 246, 266, and 286. The control unit 210 provides functions for connecting the caller terminal, the callee terminal, the first interpreter terminal, and the second interpreter terminal. The functions include~~s~~ accepting a call from the caller terminal~~, +~~ acquiring the language type of the caller and the language type of the callee~~, +~~ acquiring an interpreter selection condition~~, +~~ retrieving the terminal numbers of the first and second interpreters by referencing the interpreter registration table 212 based on the language types and the selection condition acquired~~, +~~ calling the first interpreter terminal and the second interpreter terminal ~~by~~ using the terminal numbers retrieved~~, +~~ acquiring the terminal number of the callee from the caller terminal~~, +~~ and calling the callee terminal ~~by~~ using the acquired terminal number~~—~~ acquired.

The inputs of the voice synthesis units 224, 244, 264, and 284 are connected to~~with~~ the caller terminal voice telop

memory 226, the callee terminal voice telop memory 246, the first interpreter terminal voice telop memory 266, and the second interpreter terminal voice telop memory 286, respectively. The contents of the voice telop memories 226, 5 246, 266, and 286 ~~are~~ can be set by the control unit 210. Consequently, when holding a telephone conversation through interpreters, it is possible to output necessary voice messages to the individual terminals and establish a four-party call by providing~~setting~~ the voice telop memories 226, 10 246, 266, and 286 with messages for the respective terminals, and issuing commands to select the signals of the voice telop memories 226, 246, 266, and 286 to the respective voice synthesis units 224, 244, 264, and 284.

Next, description will be given of the connection processing by the control unit 210 for holding a telephone conversation with bidirectional simultaneous interpretation.

Again, the interpreter selection information and the terminal numbers of terminals to be used by the respective interpreters are registered into the interpreter registration table 212 of the control unit 210 from an appropriate terminal (not shown) before the processing. Fig. 5 shows examples of entry items to be registered into the interpreter registration table 212. As shown in the chart, the entry items to be registered into the interpreter registration table 212 are 25 equivalent to those of the interpreter registration table 112

shown in Fig. 2. For language capabilities, however, the levels of listening comprehension and the levels of speaking abilities are registered separately. Consequently, interpreters who are the most suitable for the first 5 interpreter who interprets the language of the callee into the language of the caller and the second interpreter who interprets the language of the caller into the language of the callee are can be selected individually.

Fig. 6 shows the process flow chart of the connection 10 processing by the control unit 210. The telephone interpretation system 200 accepts an order for interpretation services when the caller calls the telephone number of the caller terminal line I/F. The telephone interpretation system 200 then calls a first interpreter terminal, a second 15 interpreter terminal, and a callee terminal, and establishes connection for the bidirectional simultaneous telephone interpretation services.

As shown in the flow chart, the presence of a call to the caller terminal line I/F 220 is detected initially (S200). 20 When a call is detected, a message for-requesting ante input of the language type of the caller is output to the caller terminal (S202) as in the first preferred embodiment. The language type of the caller, input by the caller in response, is thus acquired thus (S204). Next, a message for-requesting 25 an to-input of the language type of the callee is output to

the caller terminal by using the acquired language type of the caller (S206) as in the first preferred embodiment. The language type of the callee, input by the caller ~~in response~~, is thus acquired ~~thus~~ (S208). Next, a message ~~for~~-requesting 5 an to-input of an interpreter selection condition is output to the caller terminal (S210) as in the first preferred embodiment. The interpreter selection condition that is input by the caller ~~in response~~ is thus acquired ~~thus~~ (S212).

Next, the interpreter registration table 212 is 10 referenced~~referred~~ to select a first interpreter (S214). Here, the first interpreter should~~shall~~ have the specified interpretation levels, or a level of listening comprehension in the language of the callee and a level of speaking ability in the language of the caller, that matches~~match~~ with the 15 acquired selection condition including gender, age, residence, and the fields of specialization, and have his/her availability flag set. The terminal number of the selected interpreter is extracted and called (S216).

When the first interpreter terminal accepts~~has accepted~~ 20 the call (S218), the interpreter registration table 212 is referenced~~referred~~ to select a second interpreter (S220). The second interpreter should~~shall~~ have the specified interpretation levels, or a level of listening comprehension in the language of the caller and a level of speaking ability 25 in the language of the callee, that matches~~match~~ with the

acquired selection condition including gender, age, residence, and the fields of specialization, and have his/her availability flag set. The terminal number of the selected interpreter is extracted and called (S222). When the second 5 interpreter terminal accepts~~has accepted~~ the call (S224), a message for requesting to input the terminal number of the callee is output to the caller terminal (S226) as in the first preferred embodiment. The terminal number of the callee that is~~-~~ input by the caller in response,~~-~~ is thus acquired and 10 called (S228).

When the callee terminal accepts~~has accepted~~ the call (S230), the telephone interpretation services with bidirectional simultaneous interpretation are started (S232).

If~~In~~ case the first interpreter terminal does not accept 15 the call in S118, whether a next candidate is available is determined~~determined~~ (S234). If~~In~~ case a next candidate is available, the processing returns to S214 and is repeated.~~to repeat~~. Otherwise, the caller terminal is notified of ~~as such~~ and the call is released (S236). If~~In~~ case the second 20 interpreter terminal does not accept the call in S224, whether a next candidate is available is determined (S238). If~~In~~ case a next candidate is available, the processing returns to S220 and is repeated.~~to repeat~~. Otherwise, the caller terminal and the first interpreter terminal are notified ~~as such~~ and the 25 calls are released (S240). If~~In~~ case the callee terminal does

not accept in S230, the caller terminal, the first interpreter terminal, and the second interpreter terminal are notified as such and the calls are released (S242).

For the sake of simplicity, the selection of the first 5 interpreter (S214) and the selection of the second interpreter (S220) have been described for situations in which~~where~~ the interpreter registration table 212 is referenced~~referred~~ to select interpreters who match with the desired conditions.  
However~~predetermined~~ condition. Nevertheless, as in the first 10 preferred embodiment, the registered information about~~on~~ the appropriate interpreters may be provided ~~notified~~ via voice messages such ~~so~~ that the caller makes final selections regarding~~on~~ both of the first and second interpreters.

The control unit 210 includes~~has~~ a timer (not shown) for 15 calculating the fee for interpretation services. The timer measures the time from the beginning of a connection to the disconnection. The interpreter registration table 212 includes~~contains~~ entries regarding~~on~~ the hourly rates of the interpreters (not shown). At the end of interpretation 20 services, the fee is calculated from the time measured by the timer and the hourly rates of the first and second interpreters registered in the interpreter registration table 212. The calculated fee is registered in~~in~~ an accounting database 214, and charged to the user at a later time.  
25 The —~~Incidentally,~~ the hourly rates of the interpreters

relationship between the interpretation levels of the interpreters and the hourly rates.

The foregoing preferred embodiment has dealt with the ease where describes a configuration in which if the selected 5 interpreter terminals do not accept the call, an appropriate message is simply posted to the caller before disconnection. Nevertheless, an interpretation reservation table for registering the terminal number of the caller and the terminal number of the callee may be provided so such that the caller 10 and the callee can be notified to start of the telephone interpretation service when both of the selected first and second interpreters accept the call.

The foregoing preferred embodiment has dealt with the ease where describes a configuration in which the telephone 15 interpretation system 200 is composed of defined by the line I/Fs, the voice input and output units, the voice synthesis units, and the control unit, and so on. Nevertheless, However, these components need are not necessarily be configured as separate pieces of hardware. The functions of the units may be 20 achieved provided in the form of software processing by using a computer.

The foregoing preferred embodiment has dealt with the ease where describes a configuration in which the first interpreter terminal 32 and the second interpreter terminal 34 25 are located outside the interpretation center as similar to

The foregoing preferred embodiment describes a  
configuration in which has dealt with the case where the first  
interpreter terminal 32 and the second interpreter terminal 34  
are located outside the interpretation center similar to as  
5 the caller terminal 10 and the callee terminal 20 ~~are~~, and  
provide interpretation services when called from the  
interpretation center via the public telephone lines. However,  
the present invention is not limited thereto. Some~~It is~~  
~~understood that some or all of interpreter terminals may be~~  
10 installed in the interpretation center suchse that  
interpretation services are provided from the interpretation  
center.

In~~I~~n~~e~~i~~de~~nt~~lly~~, in the foregoing preferred embodiment,  
the interpreters can participate in interpretation services  
15 from anywhere as long as they have terminals capable of  
connecting to~~connection with~~ public telephone lines. The  
interpreters can thus make effective use of their free  
~~time~~unoccupied hours to provide interpretation services by  
using the availability flags mentioned above. This  
20 enables~~allows~~ efficient and stable operation of interpretation  
services which often have difficulty in securing necessary  
personnel.

Finally, description will be given of a recording and  
reproducing function for recording voices during telephone  
25 interpretation services, and reproducing and transmitting the

same by user requests.

Fig. 11 shows a practical example of the recording and reproducing function in the telephone communication system according to the first preferred embodiment. As shown in the 5 diagram, the voice output of the voice synthesis unit 124 to be transmitted to the caller terminal and the voice output of the voice synthesis unit 144 to be transmitted to the callee terminal are multiplexed as the left channel and the right channel, respectively, by a voice multiplexing unit 116. The 10 resultant is transmitted to a voice recording and reproducing unit 118.

During interpretation services, the voice output of the voice multiplexing unit 116 is automatically recorded by the voice recording and reproducing unit 118 based on a command 15 from the control unit 110, and is stored user by user. The voices stored in the voice recording and reproducing unit 118 are reproduced by a command from the control unit 110 when the voice input and output unit 122 or 142 detects that 20 predetermined dial numbers are pressed from the caller terminal or the callee terminal. The reproduced voices are transmitted to each terminal via the voice synthesis unit 124 or 144 of the detected terminal.

Consequently, if the user terminals have a voice demultiplexing function, the voices of the respective 25 terminals during interpretation services may be

~~reviewed~~~~checked~~ in the language of the caller on the left channel and in the language of the callee on the right channel.

Users~~Incidentally,~~ users can also reproduce and ~~reviewed~~~~checked~~ the voices stored in the voice recording and reproducing unit

5 118 at a later time~~afterward~~ by calling the interpretation center and inputting predetermined access codes from their terminals.

The ~~Incidentally,~~ the method of synthesizing the voices to be recorded into the voice recording and reproducing unit

10 is not limited to the method described above.~~foregoing one.~~

Any type~~kind~~ of method may be used as long as the users can ~~reviewed~~~~checked~~ the details of the interpretation services. Since some user terminals do not have the voice demultiplexing function, the voices to be transmitted to the caller terminal

15 and the voices to be transmitted to the callee terminal may be recorded separately. In this case, either one of the voices designated from a terminal can be reproduced for transmission.

~~The users may include persons other than those who have received the interpretation services. The users may include~~

20 ~~persons other than those who have received the interpretation services. The images and voices stored in the voice recording and reproducing unit 118 may also be reproduced and transmitted when access-authorized persons call the interpretation center by using their telephone terminals and~~

25 input predetermined access codes.

Fig. 12 shows a practical example of the recording and reproducing function in the telephone communication system with bidirectional simultaneous interpretation according to the second preferred embodiment. As shown in the diagram, the 5 voice output of the voice synthesis unit 224 to be transmitted to the caller terminal and the voice output of the voice synthesis unit 244 to be transmitted to the callee terminal are multiplexed as the left channel and the right channel, respectively, by a voice multiplexing unit 216. The resultant 10 is transmitted to a voice recording and reproducing unit 218.

During interpretation services, the voice output of the voice multiplexing unit 216 is automatically recorded by the voice recording and reproducing unit 218 based on a command from the control unit 210, and is stored user by user. The 15 voices stored in the voice recording and reproducing unit 218 are reproduced by a command from the control unit 210 when the voice input and output unit 222 or 242 detects that predetermined dial numbers are pressed from the caller terminal or the callee terminal. The reproduced voices are 20 transmitted to each terminal via the voice synthesis unit 224 or 244 of the detected terminal.

Consequently, if the user terminals have a voice demultiplexing function, the voices of the respective terminals during interpretation services can be 25 reviewed in the language of the caller on the left

channel and in the language of the callee on the right channel.

Users~~Incidentally~~, users can also reproduce and check the voices stored in the voice recording and reproducing unit 218 at a later time~~afterward~~ by calling the interpretation center and inputting predetermined access codes from their terminals.

The — ~~Incidentally~~, the method of synthesizing the voices to be recorded into the voice recording and reproducing unit is not limited to the method described above.~~foregoing one~~.

Any typekind of method may be used as long as the users can review~~check~~ the details of the interpretation services. Since some user terminals do not have the voice demultiplexing function, the voices to be transmitted to the caller terminal and the voices to be transmitted to the callee terminal may be recorded separately. In this case, either one of the voices designated from a terminal can be reproduced for transmission.

The users may include persons other than those who have received the interpretation services. The voices stored in the voice recording and reproducing unit 218 may also be reproduced and transmitted when access-authorized persons call the interpretation center by using their telephone terminals and input predetermined access codes.

The foregoing preferred embodiments describe configurations in which~~have dealt with the cases where~~ the caller terminal, the callee terminal, and the interpreter terminal(s) use ordinary telephone terminals to be connected

to public telephone lines. However~~Nevertheless~~, the present invention is not limited thereto. The present invention may also be applied to configurations in which~~the cases where~~ dedicated telephone terminals to be connected to dedicated 5 lines are used, and in which~~where~~ IP (Internet Protocol) type telephone terminals to be connected to Internet lines are used. Even in these cases, similar telephone interpretation systems or similar telephone interpretation methods are enabled~~can be achieved~~ to provide the effects and advantages of the present 10 invention.

Moreover, the present invention may be applied to the function of transmitting and receiving voices in interpretation services that use videophone sets having an image and voice communication function. In this case, the 15 caller and the callee ~~can see the images of the interpreters, and the interpreters can see the images of the caller and the callee. This facilitates understanding of grasping the details of the interpretation, which enables allowing the provision of~~ quicker and more precise interpretation services.

20

#### INDUSTRIAL APPLICABILITY

As described above, according to the telephone interpretation system and the telephone interpretation method of the present invention, the speech of the speaker and the 25 comprehension of the interpretation by the conversation

~~partner~~~~opponent~~ party are not disturbed even when an interpreter performs simultaneous interpretation, while a caller or a callee is speaking ~~is provided~~. This provides for ~~allows the effect of~~ quick and precise interpretation.

5       While the present invention has been described with respect to preferred embodiments, it will be apparent to those skilled in the art that the disclosed invention may be modified in numerous ways and may assume many embodiments other than those specifically set out and described above. Accordingly, it

10      is intended by the appended claims to cover all modifications of the present invention that fall within the true spirit and scope of the invention.